

TOSHIBA INSULATED GATE BIPOLAR TRANSISTOR SILICON N CHANNEL IGBT

# GT15J311, GT15J311(SM)

HIGH POWER SWITCHING APPLICATIONS  
MOTOR CONTROL APPLICATIONS

- Third-generation IGBT
- Enhancement mode type
- High speed :  $t_f = 0.30\mu s$  (Max.) ( $I_C = 15A$ )
- Low saturation voltage :  $V_{CE(sat)} = 2.7V$  (Max.) ( $I_C = 15A$ )
- FRD included between emitter and collector

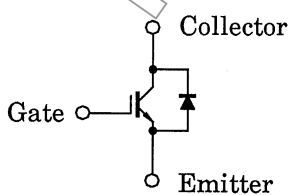
### Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

| CHARACTERISTIC  | SYMBOL    | RATING   | UNIT       |
|---|-----------|----------|------------|
| Collector-Emitter Voltage                             | $V_{CES}$ | 600      | V          |
| Gate-Emitter Voltage                                  | $V_{GES}$ | $\pm 20$ | V          |
| Collector Current                                     | DC        | $I_C$    | 15 A       |
|   | 1ms       | $I_{CP}$ | 30 A       |
| Emitter-Collector                                     | DC        | $I_F$    | 15 A       |
| Forward Current                                       | 1ms       | $I_{FM}$ | 30 A       |
|   |           |          |            |
| Collector Power Dissipation<br>( $T_c = 25^\circ C$ ) | $P_C$     | 70       | W          |
| Junction Temperature                                  | $T_j$     | 150      | $^\circ C$ |
| Storage Temperature Range                             | $T_{stg}$ | -55~150  | $^\circ C$ |

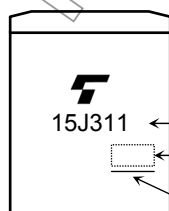
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

### Equivalent Circuit

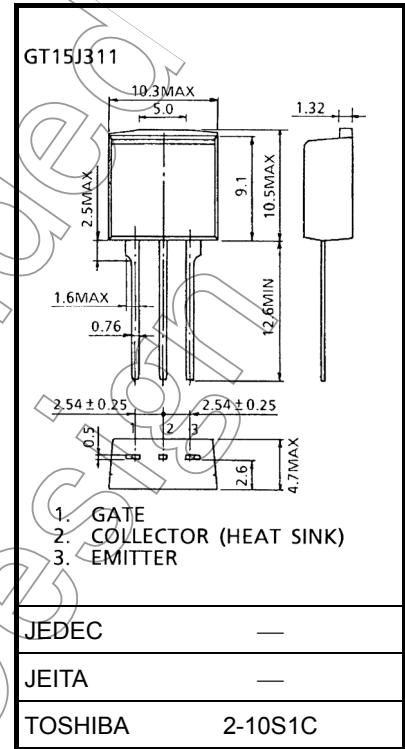


### Marking

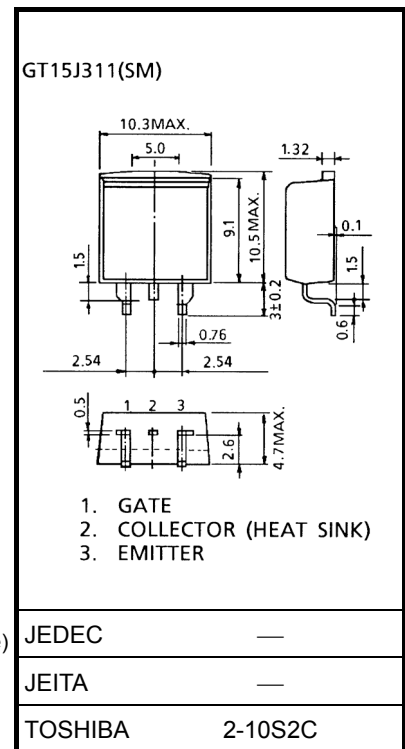


15J311 ← Part No. (or abbreviation code)  
 Lot No.  
 A line indicates lead (Pb)-free package or lead (Pb)-free finish.

Unit: mm



Weight: 1.5 g (typ.)

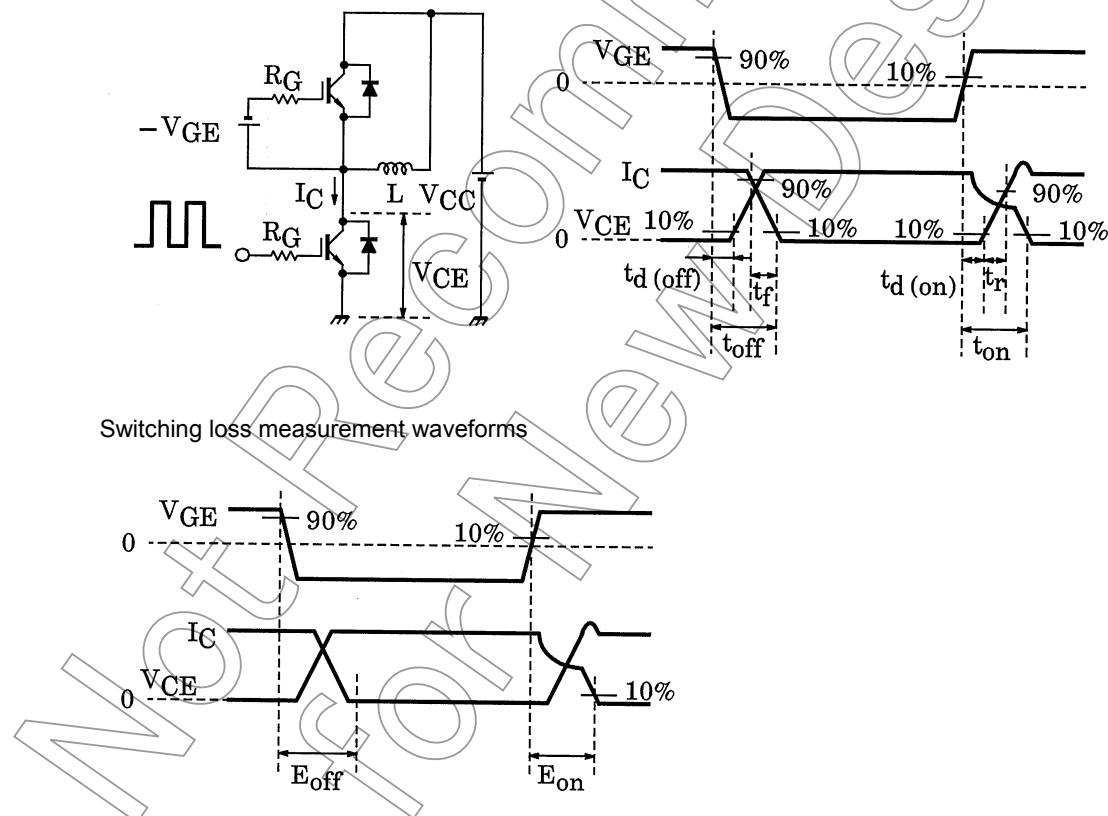


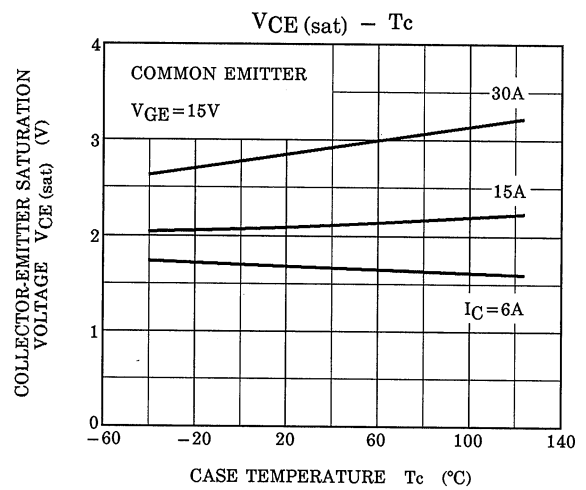
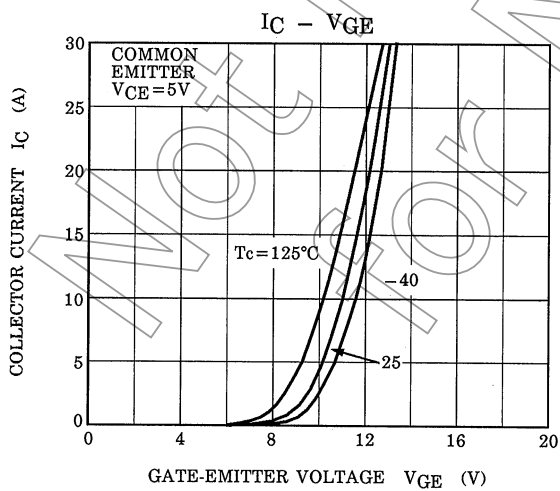
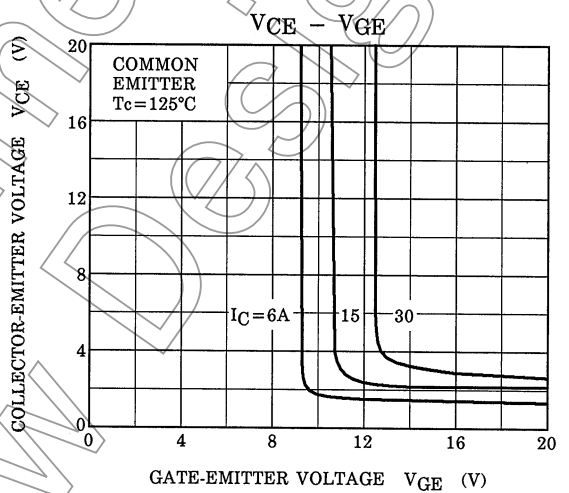
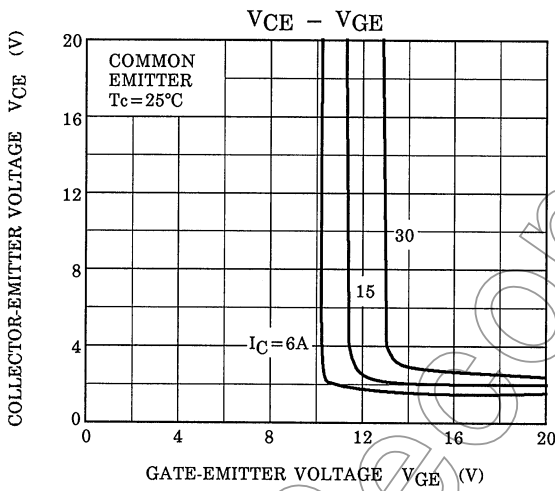
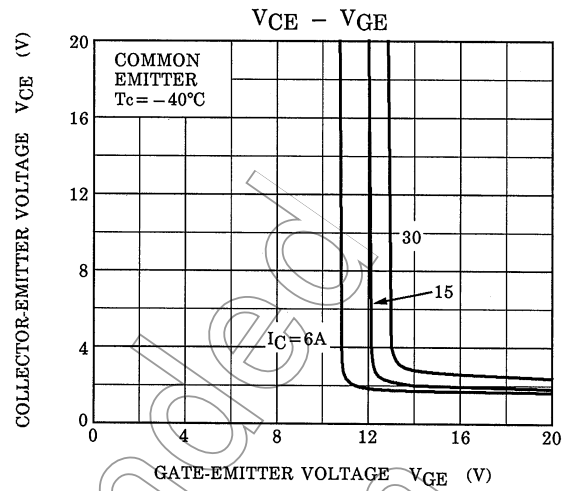
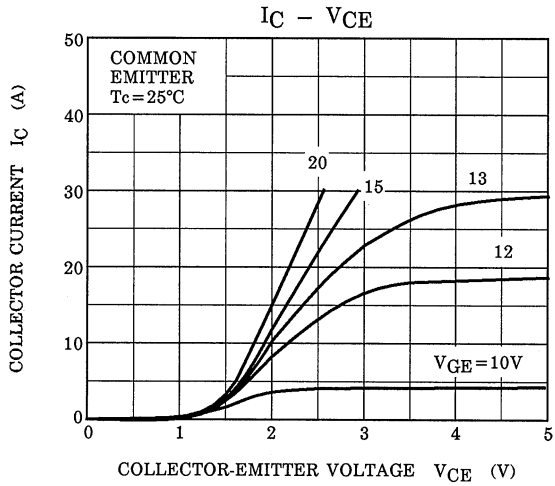
Weight: 1.4 g (typ.)

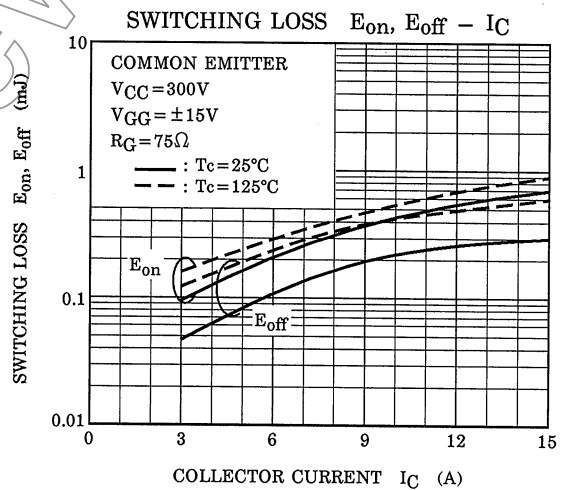
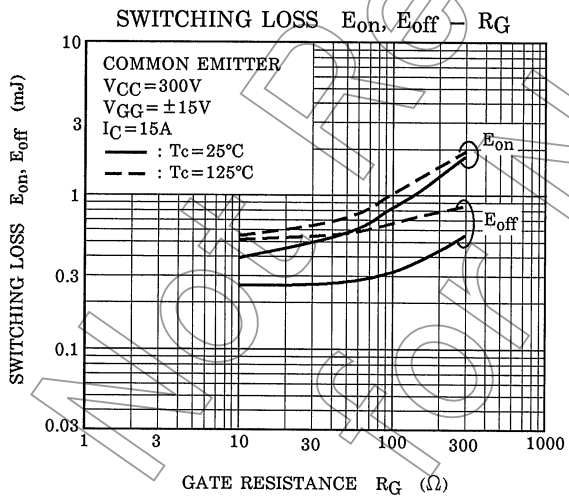
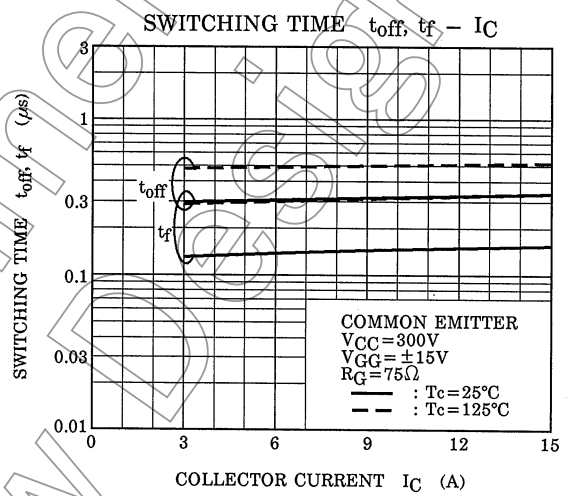
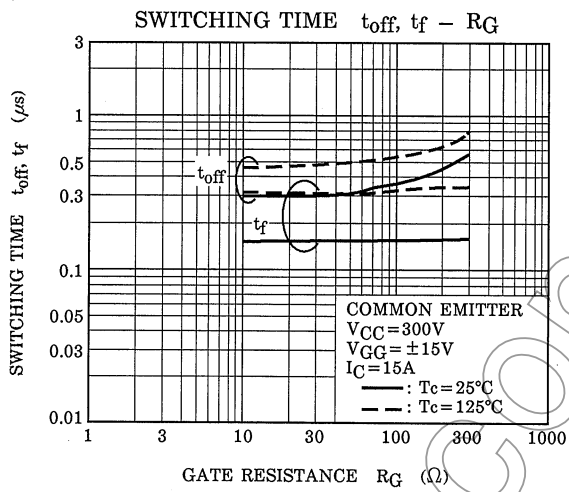
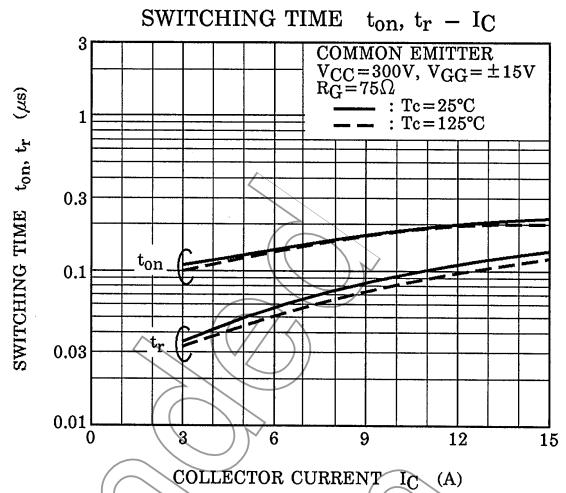
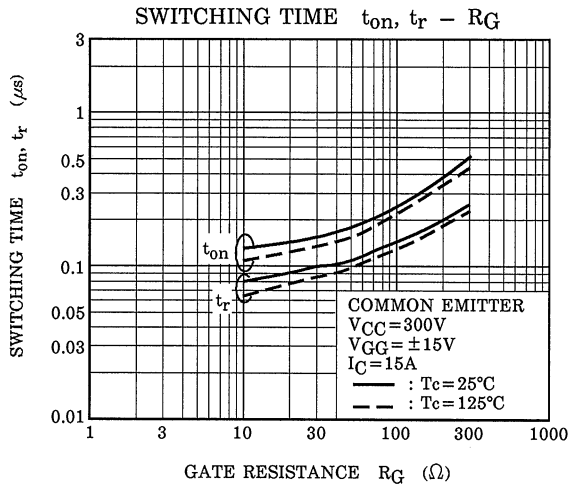
## Electrical Characteristics (Ta = 25°C)

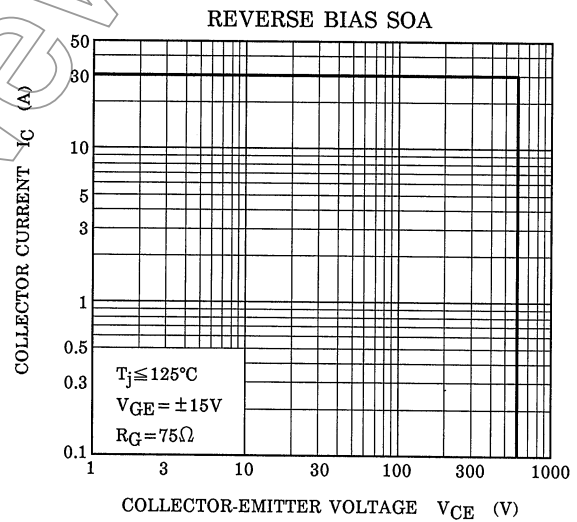
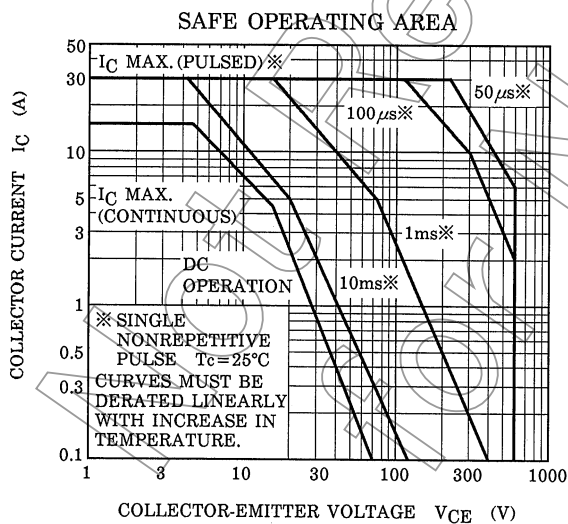
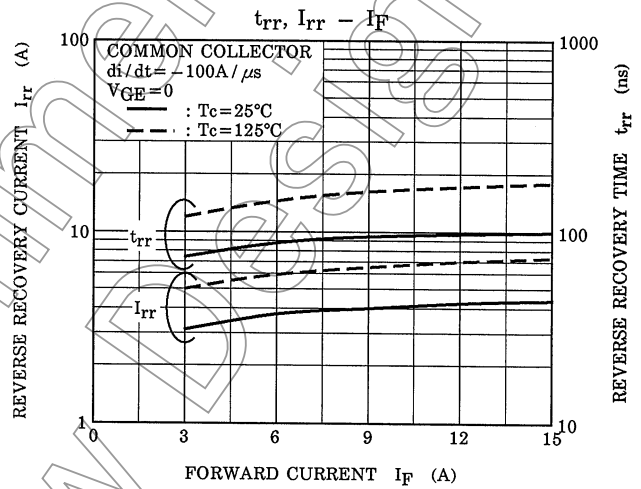
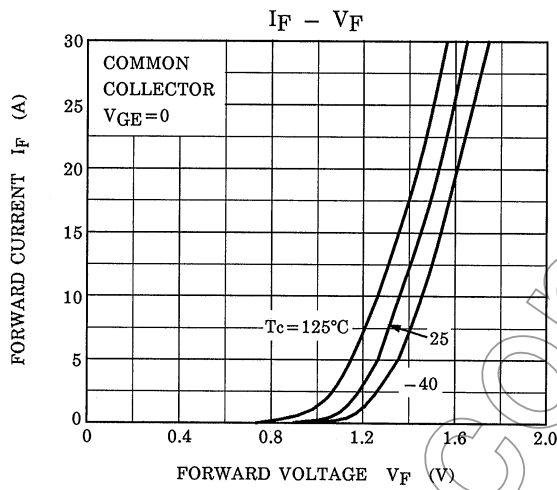
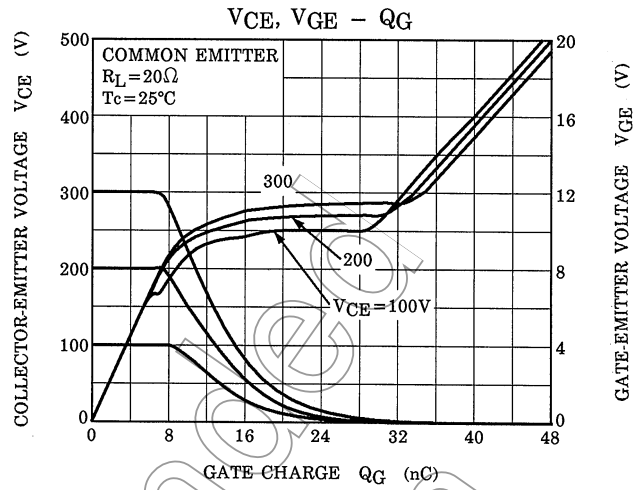
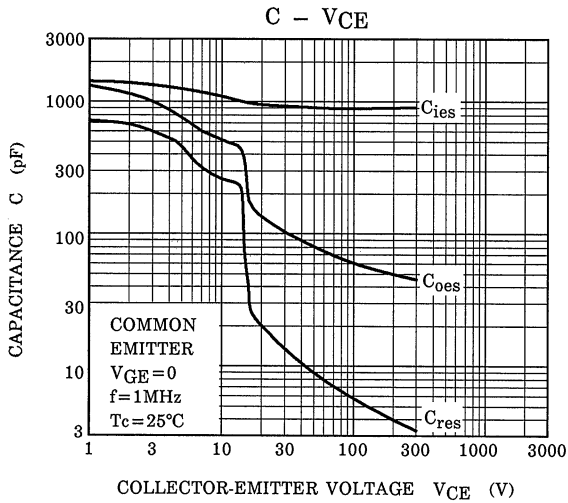
| CHARACTERISTIC                       |               | SYMBOL        | TEST CONDITION   | MIN | TYP. | MAX       | UNIT    |
|--------------------------------------|---------------|---------------|--|-----|------|-----------|---------|
| Gate Leakage Current                 |               | $I_{GES}$     | $V_{GE} = \pm 20V, V_{CE} = 0$   | —   | —    | $\pm 500$ | nA      |
| Collector Cut-Off Current            |               | $I_{CES}$     | $V_{CE} = 600V, V_{GE} = 0$  | —   | —    | 1.0       | mA      |
| Gate-Emitter Cut-Off Voltage         |               | $V_{GE(OFF)}$ | $I_C = 1.5mA, V_{CE} = 5V$   | 5.0 | —    | 8.0       | V       |
| Collector-Emitter Saturation Voltage |               | $V_{CE(sat)}$ | $I_C = 15A, V_{GE} = 15V$  | —   | 2.1  | 2.7       | V       |
| Input Capacitance                    |               | $C_{ies}$     | $V_{CE} = 20V, V_{GE} = 0, f = 1MHz$   | —   | 950  | —         | pF      |
| Switching Time                       | Rise Time     | $t_r$         | Inductive Load<br>$V_{CC} = 300V, I_C = 15A$<br>$V_{GG} = \pm 15V, R_G = 75\Omega$<br>(Note 1) | —   | 0.12 | —         | $\mu s$ |
|                                      | Turn-On Time  | $t_{on}$      |  | —   | 0.40 | —         |         |
|                                      | Fall Time     | $t_f$         |  | —   | 0.15 | 0.30      |         |
|                                      | Turn-Off Time | $t_{off}$     |  | —   | 0.50 | —         |         |
| Peak Forward Voltage                 |               | $V_F$         | $I_F = 15A, V_{GE} = 0$  | —   | —    | 2.0       | V       |
| Reverse Recovery Time                |               | $t_{rr}$      | $I_F = 15A, di/dt = -100A/\mu s$   | —   | —    | 200       | ns      |
| Thermal Resistance (IGBT)            |               | $R_{th(j-c)}$ |  | —   | —    | 1.79      | °C/W    |
| Thermal Resistance (Diode)           |               | $R_{th(j-c)}$ |  | —   | —    | 3.45      | °C/W    |

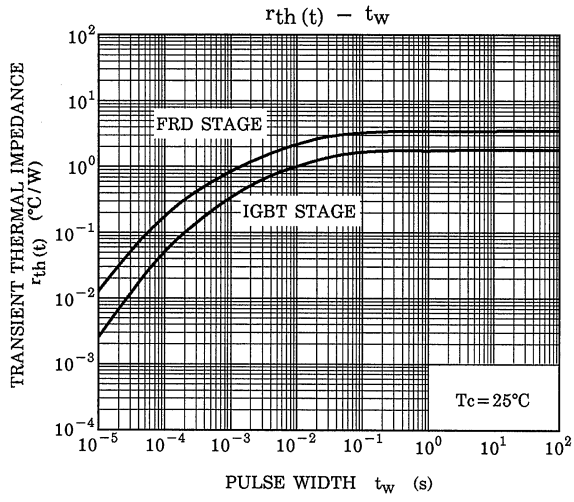
Note 1: Switching time measurement circuit and input / output waveforms











Not Recommended for New Design



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